TOOLS FOR THE FIELD, TESTING AND TRACEABILITY IN THE DISTIBUTION OF FOOD INGREDIENTS

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Analytical Testing

- 300 Million Dollar business in the US.
- Genetically Engineered or GE adds approximately 39 million to this number
- Food safety is in forefront of public awareness.

Reasons for testing

- Human and animal health
  - Clean and free from filth, harmful products and bacteria
- Liability
  - Company and brand protection

Testing, What and Why

- Contamination
- Spoilage
- Nutritional analysis
- Modified Ingredients

- Bacterial
- Foreign material
- Molds
- Adulteration
- Molds, spores
- Electrolyte content
- Proteins and lipids
- Percent of GE Material

Oversite in Food Safety

- Hazardous Analysis of Critical Control Points. HACCP.
- USDA/GIPSA-Federal inspection programs in food and grain handling.
- FDA-labeling claims, nutritional analysis.
- EPA-evaluates new GE crops and their impact on the environment.
- ISO- International quality standards that encompass all phases of a process from product concept to realization.

The Risks of GM Crops Drivers

Some consumers, along with advocacy groups, have voiced concern about the safety and environmental impact of these new food products.

- Some urge an outright ban on GM foods. Others support mandatory labeling.
- Some support more stringent testing before marketing products
- GE crops do not fall into the realm of a “food safety” issue.

GM Foods - Safe or Not ?

- *The Great Taco Debacle, September 2000*
  - Taco shells sold in grocery stores & restaurants contained illegal traces of a genetically engineered corn variety, altered to contain an insecticidal toxin not approved for human consumption due to potential allergic reactions.
  - A U.S. government recall involved 300 corn products.
  - More than 430 million bushels of corn was contaminated.

GM Foods - Safe or Not ?

- *The Great Taco Debacle, September 2000*
  - Aventis, the maker of StarLink corn said that in the year 2000:
    - over 1.7 million diagnostic tests were performed on corn to verify the presence of the Cry9c gene.
    - This resulted in the rerouting of more than 8,000 trucks, 15,000 rail cars, and 285 barges.
    - The company will never be able to completely remove the variety from the country's corn supply.

Gene Technology & Food

- **Gene technology in crops and food = opportunities & challenges.**
- **Consumer concerns over GM foods drive labeling.**
- **Countries implementing laws for labeling GM Food/Feed**
- **No scientific evidence but consumers have a right-to-know.**
- **Food retailers/producers & seed industry work to respond.**

Cry9C – Starlink corn

- Unapproved in human food use.
- Zero tolerance imposed in yellow corn for domestic and export products.
- SDI “first to assist” with strip test and USDA GIPSA validation.
- Detection limits to .017 % with 800 kernel sample

Testing Methods available

- Immunoassay strip test
- Robust, reliable and low cost.
- Perform analysis in the field rapid, result.
- Cost around $3.00 per sample.
- Qualitative.

- ELISA immunoassay micro titer plate.
- 2-4 hour test.
- Laboratory or field based.
- Cost around $2.50 - $4.00 per sample
- Quantitative test

Testing Methods Continued..

- PCR (polymerase chain reaction)
- Can achieve low levels of detection.
- Laboratory based method.
- Higher degree of training required.
- Cost $125.00 - $300.00 test.
- Minimum TAT 3 days.
- Qualitative methods, good second method lab-based confirmation of field programs.

Identity Preservation

- A program or system that provides a comprehensive record for a product from the seed to the finished product. A program that will provide the commodity/food ingredient buyers proper chain of custody documentation and validation for their labeling programs.

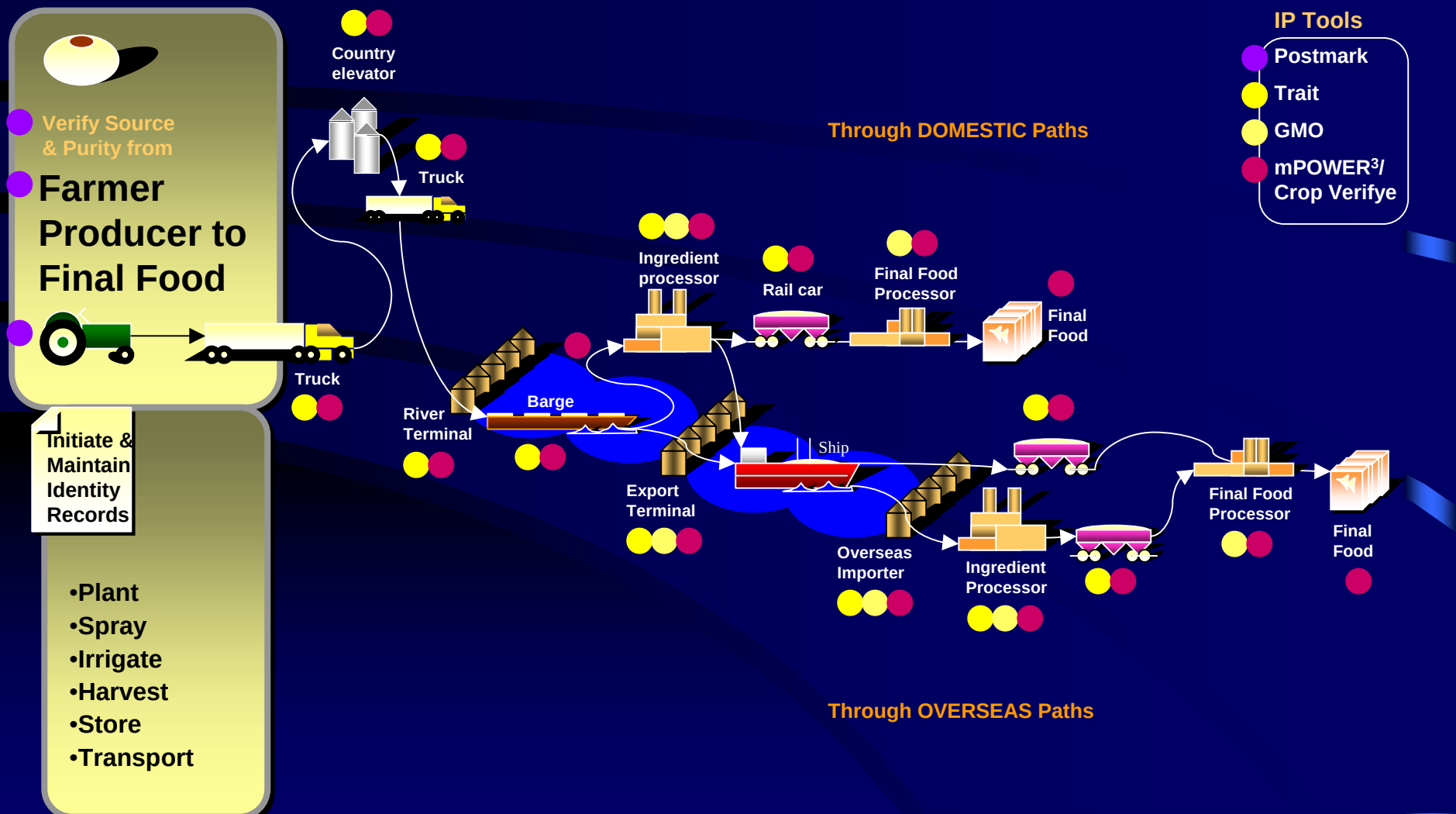
Testing and Tracking

- Must start at the beginning at seed co. and producer level.
- Must be affordable, robust and simple to use and manipulate.
- Testing final, processed food products is not good practice. Accountability must be present throughout the system.

Players in an IP System

- Seed Producer
- Farmer/ Producer
- Country Elevator
- River Elevator
- Terminal
- Export Terminal
- Import Terminal
- Laboratories
- Inspectors
- Software companies
- Food Processors
- Raw Ingredient Processors
- Commodity Brokers

IP Pathways & Movement



Testing supports Identity Preservation

- Risk must be assessed.
- Confidence level established
- Vertical Integration
  - Contract directly with producers.
  - Control the seed, the soil and conditions
  - Purchase the commodity
  - Testing has still been observed.

Field Testing Methods

- Available for several years.
- Accuracy and reliability questioned.
- Great advancements in the past decade.
- Immunoassay, fluorescence, NIR, modified wet chemistry methods.
- Rapid methods for contaminants.

Immunoassay Design

- Accurate analysis in the field
- Most common technology for in field detection of GE grain and raw ingredient.
  - Low/no technical skill requirement
- Significant benefit to the customer
  - Low cost
  - Highly accurate results

Common Analyses Designed to Perform Within Existing Grain Processing Procedures

- Moisture
- Physical Charactaristics
- Foreign Material
- Filth
- GE content
- Mycotoxin content

Further Testing in the System

Quantitative methods
- -confirm positives
- -lower detection limits

Proteins
Lipids
Bacteriological
Ingredients
Bioavailability

-Supports label claims
-Level of scrutiny helps ensure safer products.

Potential Impacts on Safety and Quality.

- IP and increased scrutiny has produced higher quality product.
- Theorize higher quality results in better safety
- IP has a role in Homeland Security.
- Shared liability promotes better handling and trace ability product.
- Identity preservation and testing become a “pull through” concept.
- Potential labeling laws also drive protocols.

Thank you
For More Info on GM Foods:

- Biotechnology & Food Safety,
www.oecd.org//subject/biotech/faq.htm

- Biotechnology: Solutions for Tomorrow's World
www.monsanto.com/ag/articles/BioBrochure/TOC.htm

- Aventis Crop Science
www.aventis.com

- European Food Information Council
www.eufic.org